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Develop more efficient capital projects with an EPC 4.0 strategy

Digital technologies are being widely adopted across nearly every industry. Industrial companies are moving as far away as possible from manual, document-centric processes and replacing them with cloud services, digital solutions and data-centric strategies. As a result, the manufacturing industry has almost doubled its productivity over the last 20 yr. This has not translated to the process industry, where digital technologies have not been adopted to the same extent.

In a capital project execution phase, manual and document-centric processes are still preferred on both the engineering, procurement and construction (EPC) and owner side, and productivity has flat-lined. In a document-centric system, information is shared by passing paper, PDF or Excel documents between teams, departments, clients and suppliers. This type of manual information transfer carries a large risk for error as documents are passed from one person to another. It is also an inefficient process, with engineers spending 50% of their time looking for and validating information, ultimately leading to misguided decision-making, low transparency and the constant need to translate data.

While engineering makes up only 10% of the capital project cost, engineering errors propagate throughout the procurement and construction phase, resulting in material waste, rework and delays. The cost of engineering errors alone comprises 14% of the total project cost and can cause significant schedule delays.

A crucial strategy. This is where an EPC 4.0 strategy becomes crucial to both an organization's long-term digital transformation and its everyday operations. EPC 4.0 offers a data-centric approach for the engineering, procurement and construction industry to collaborate through a unified viewpoint. With EPC 4.0, entire processes can be tracked in a digital environment from the engineering and design stage, to procurement and execution, and through the final construction and handover phase. EPC 4.0 can streamline the workforce and take control of data, reducing the risk for errors, delays and increased project cost throughout the asset lifecycle.

Before any further details of EPC 4.0 are discussed, it is helpful to take a look back at the brief history of EPC strategies. EPC 1.0 was all about doing projects on a drafting table and in paper deliverables, where a small group of people worked together in one room, collaborating to make real-time updates. As the workplace evolved, getting everyone into one room became more difficult and hindered national and global collaboration efforts.

EPC 2.0 relied on computer-aided design (CAD) systems and distributed spreadsheets, which involve the use of computers to lead in the conception, modification, analysis or optimization of a design. Once upon a time, CAD systems were pitched as the solution that was going to "change the day." However, the problem with CAD systems is that everyone from the owner to the supplier and the EPCs working on the project could have their own CAD system, making consistency more difficult.

EPC 3.0 was designed to move engineering to low-cost centers and sub-out fabrication. However, this strategy has not been proven to increase productivity, nor has it made the significant changes that it once promised due to siloed engineering functions.

With the aid of digitization, EPC 4.0 allows for more collaboration opportunities on a digital and unified scale. Here are some suggested best practices to improve an EPC 4.0 strategy:

1. **Adopt data driven project execution.** To keep a competitive edge, owner-operators and EPC companies must drop their manual tracking processes and adopt one unified, integrated, data-centric system that can autonomously flag updated information and store it in one place for consistency. A data-centric approach allows for everyone working on the project to see what is going on. Everyone sees the same real-time information, can easily locate the right data and make real-time changes and confident decisions.

   Digitizing project execution also means more efficient project delivery. Data between engineering, procurement, construction and handover are aligned, ensuring connected decision-making supported by trusted data. Vendor information, requisitioning, expediting and site material control are centrally controlled. Construction planning integrated with engineering and complete contract control enable highly efficient project delivery.
2. **Move to the cloud where data becomes intelligent information.** Consider moving to the cloud. Adopting

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cloud operations for a capital project ensures that all analytics are captured and stored in one central place. The data management strategy and environment must be set up in a cloud so that everyone from executives to vendors, suppliers and engineers have access to the right data—turning data into intelligent, actionable information.

3. **Validate design and train operators to start up faster.** Starting up a plant quickly and efficiently after a capital project benefits both the EPC and the owner-operator. In addition to process design, process simulation models can be used to validate the design of EPCs, process licensors, controls vendors and package vendors, and allow virtual commissioning and startup of plants, even before the equipment has been procured. Benefits include high confidence in startup schedules and reduced time-to-design rates. Simulators can also be used to train operators and are seven times more effective than classroom training. This allows operators to be better prepared before real plant startup, further reducing project risk.

The author's company provides engineering software that is designed to improve the way projects are engineered, executed and integrated into operations and maintenance in line with an EPC 4.0 strategy. Taking this one step further, the company recently launched a unified engineering cloud platform[a] that allows process engineers and other engineering disciplines, such as mechanical, instrumentation, electrical, piping and structural engineers, to work together in a unified environment, thereby increasing efficiency, improving change management and reducing error. This can cut engineering time in front-end engineering design (FEED) by 50%, enabling engineers to spend more time on creating higher-quality deliverables, ensuring fewer errors and unexpected costs in procurement and construction.

By leveraging an EPC 4.0 strategy and work processes, a workforce can collaborate and take control of the data, reducing the risk for errors, delays and increased project cost throughout the asset lifecycle. Learning from and applying these best practices for an EPC 4.0 strategy can empower engineers to work together more efficiently, allow for more time on engineering and design phases, and encourage better communication at every phase of procurement and construction. EPC 4.0 means taking control of data and empowering the workforce to realize reduced costs, reduced delays and a safer workplace. HP

NOTES

[a] AVEVA Unified Engineering

AMISH SABHARWAL is the Executive Vice President for AVEVA's engineering business unit, which is responsible for bringing simulation, engineering, design, project execution, operator training and project management software to the global industrial market. He has 25 yr of experience working globally within the oil and gas, petrochemicals and power industries. Over the past 20 yr, he has focused on the digital transformation journeys of owner-operators, EPC firms and suppliers by leveraging technology to create value-added opportunities to their business processes. Mr. Sabharwal is a professional engineer who holds BS and MS degrees in chemical engineering from the University of Calgary in Canada.